PLANNING AND DEVELOPMENT STRATEGIES FOR ENERGY CONSERVATION

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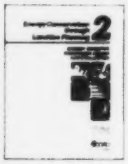
This booklet forms part of the kit
ENERGY CONSERVATION THROUGH LAND USE PLANNING

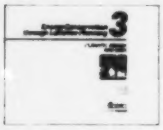
The kit is a collection of materials designed to help those involved in developing and making decisions on energy sensitive subdivisions.

Each piece was designed for a particular purpose:

Planning and Development Strategies for Energy Conservation provides a general **overview** of energy conservation as it relates to land use planning.



Energy Sensitive Subdivision Design and Evaluation provides a **process** for identifying and utilizing opportunities for energy conservation in subdivision design.



Climatic Design and Data provides more detailed technical **information** and relevant data.

Copies of this kit may be obtained from:

Inter Agency Planning Branch
Planning Services Division
Alberta Municipal Affairs

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PLANNING AND DEVELOPMENT STRATEGIES FOR ENERGY CONSERVATION

Booklet #1 in the series

Energy Conservation through Land Use Planning

Inter Agency Planning Branch
Planning Services Division
Alberta Municipal Affairs
September, 1985

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Introduction

Oil and gas are key elements in the economy of Alberta, contributing directly and indirectly to the well-being of numerous Albertans. The fluctuations in demand for petrochemicals and feedstocks, with their attendant impact on employment and economic growth in general, has reminded many of the importance of this sector of the economy.

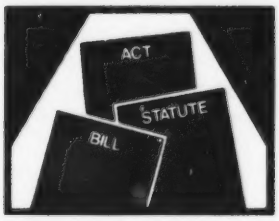
The effects of these fluctuations have been felt by municipal governments as well. The cost of providing goods and services to the community continues to escalate. For example, the cost of street lighting, police protection, public transit services, and the maintenance of city-owned buildings and vehicles is increasing at rates often above that of inflation.

During the years of rapid growth, the explosive rate of residential, and in some areas commercial development, provided little opportunity for either the building industry or the municipality to consider the long term implications of sometimes hasty development. Moreover, the events of the past several years have transformed the nation's home building industry. Alberta's builders have been among those most severely affected. This, coupled with the slowing of the economy in general, has slowed the growth of municipal development, with its attendant population influx and expanding tax base, and changed the nature of what development is occurring.

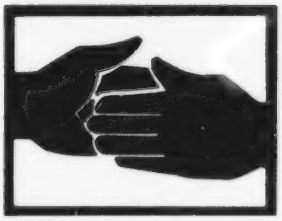
These economic conditions limit the ability of local government in some areas, and open opportunities in others. Three themes characterize the situation:

1. Long term **limits on government spending**. Government at all levels are responding to the slowed economy by bringing expenditures in line with revenues. Which, of course, have slowed along with the economy. There is concern to do more with less, and to limit spending over the long run.

2. Interest in **de-regulation.** Public and elected officials are increasingly facing demands to analyze, remove or streamline land development procedures and regulations, to match the changes occurring in the private sector;



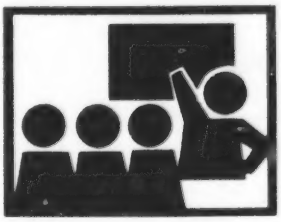
3. **Cooperation** between government and private sector. The avoidance of conflict through identifying areas of shared concern and responsibility, as the basis for cooperation, is becoming a more frequent response to the mutual needs of both sectors. Municipalities are increasingly turning to incentives and education rather than regulation, in their dealings with the private sector.



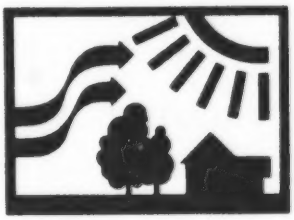
Energy Conservation and Municipal Government

Why should municipal government get involved in energy conservation? The principal reason is economic: it is good business practice to cut costs of any kind, particularly when the municipal budget is under constraint, and energy costs have tended to rise faster than any other costs affecting municipalities in recent years. A municipality can take a number of measures to cut energy costs, having short- and long-term impacts on their cost picture.

A good place to start, with often dramatic short-term benefits, is for a municipality to cut its own expenses for energy. Costs saved in the municipality's own operations mean that less money will need to be collected through taxes, to maintain the same level of municipal services. These are important considerations when both governments and tax payers have been hard hit by the recession, and grants from senior levels of government have perhaps not made up the difference.



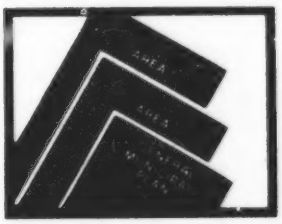
Through playing a leadership role, by offering incentives and encouragement, **a municipality can stimulate others** in the community to become more energy-sensitive. Energy saving measures by businessmen and residents not only result in individual cost-saving but they can have another, indirect impact on the community. Usually, lowered energy costs mean that more money stays in the community, since payments for energy tend to flow out to the larger economy. Keeping more money in the community, through patronizing local businessmen can create more economic activity, through increased incomes and new job opportunities, and thus improve the welfare of everyone in a small community.



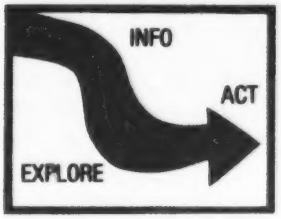
Of longer term benefit, the municipality can ensure that its land use planning and development activities are based on **sound energy conservation principles**. By adopting more flexible planning and development tools, and by removing barriers to innovation, municipalities can stimulate and support the efforts of the building and development industries to offer more energy efficient products.

Through its planning documents, the municipality can ensure that its own plans for development will result in reduced costs over the long-term. Improved subdivision layouts; increased densities; improved circulation patterns, including provisions for pedestrians; and greater efficiency in servicing will, over the long run cost less and offer residents a wider range of choices in the communities in which they live.

Through managing its own energy resources more wisely, and through stimulating others to do the same, a municipality can play an important part in ensuring its own long-term economic wellbeing. Energy efficient building technology is in the process of emerging and more and more builders are seeing energy efficiency as a major selling point for their product. New products and equipment are becoming available continually. Architects, builders and planners are evolving knowledge and experience in energy conserving design approaches that are cost-effective and acceptable to consumers.



Municipalities can make use of these evolving technologies to safeguard their own economic well-being. The techniques are available; the strategies have been developed and tested. All that is needed is the willingness to explore the options, and the commitment to take action.



Keys to a Successful Program

Those municipalities which have developed successful programs of energy conservation have done so through establishing the legitimacy of their role, through demonstrating the benefits of an energy conservation program and therefore establishing their credibility, and through building a constituency of supporters for their involvement. There are three key ingredients in achieving these:

1. **Political Commitment:** municipal council must be convinced that energy management can save money, both in the short term, and over the long term, and then take action.
2. **Goals and Objectives:** if council decides to go further with its energy conservation activities, it will want to set out some goals and objectives, and perhaps include a number of these in the statutory plans, or (where appropriate) in the land use bylaw.
3. **Establish an Advisory Committee:** since many of the longer term measures are non-regulatory and depend on cooperation with developers, builders and others in the business community, it may be found helpful to council to establish a body of interested individuals and groups, and key community leaders, who can consider energy-related issues and suggest actions or initiatives.

Achieving Political Commitment

A municipal council should be convinced that a program of energy conservation will be worthwhile before it takes action, since any program will require effort and resources if it is to be successful. Experience has shown that immediate savings can be realized through a municipality reducing its own energy costs.

Once this approach has been successful, then there are some medium and long term steps which can be taken, involving actions through the land use planning instruments available under the Planning Act, and involving the various concerned interests in the community. Often council can make use of an Advisory Committee, made up of representatives from community interests, as a means of achieving the continuing support necessary for the success of a long term program.

Developing Energy Conservation Goals

Municipal council will wish to examine the conservation of energy through two different sets of goals: one, the short-term, where a number of actions can have immediate benefits; and

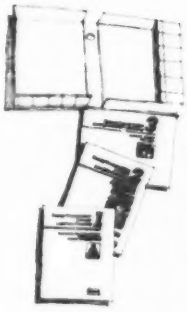
two, the longer-term, where often substantial capital outlays are necessary to yield energy-savings, and through the mechanism of land-use planning, where development and building activities can be subjected to scrutiny and designed to achieve savings.

Energy goals and objectives can be incorporated as part of a statutory plan. These have as their purpose:

- making explicit statements by a local government that energy conservation is a legitimate area for local concern and action;
- providing direction for administration and technical staff to allocate time and resources to plan for and develop energy conservation initiatives; and
- creating a legal basis for subsequent implementation actions based upon the provisions of the plan.

Two kits have been developed to assist municipalities in developing and implementing an energy conservation program:

Energy Management for Municipalities lays out a process for achieving short-term energy conservation sucesses.



Energy Conservation Through Land Use Planning deals with the use of land-use planning techniques to achieve municipal energy savings.

Both kits may be obtained from: Inter Agency Planning Branch
Planning Services Division
Alberta Municipal Affairs

Establishing an Advisory Committee

An approach being taken in many municipalities is the formation of a community-based energy conservation steering or advisory committee. The credibility of such a body is derived from having represented on it the key people in the business community, banking, industry and the energy utilities. For any program to be fully successful, the participation of these representatives of community groups, along with members of other interest groups and the residents themselves is vital.

For example, the City of Ottawa's Energy Action Plan process is based upon analysis and recommendations from an Energy Advisory Committee whose members are drawn from all segments of the city. It is producing a community-developed and publically-debated plan for the residential, commercial, industrial and transportation sectors of energy use. One of the initial roles for such a body can be to define suitable local government roles and areas for study and initiatives, and to articulate these suggestions to elected officials and the community-at-large.

There are five key functions that an Advisory Committee would perform:

- **Share an understanding of the problems and workable solutions.** If citizens, business groups, developers and other interests are excluded, energy planning and attempts to implement programs will fail to have the support essential for their success. In order to achieve a sense of commitment, these groups must participate during the earliest stages of municipal involvement, in dialogue with staff and elected officials.
- **Promote conservation** and educate the community about its benefits. The municipal government's own successes should be made known, so that other elements in the community will respond to this leadership by investigating the benefits of their own program of conservation. Frequently, educational materials are available from provincial and federal governments, and can form the basis for a municipal promotion of the idea of conservation.
- **Recognize and make use of resources in the community.** Many communities are rich in institutional and professional capabilities: local architects, engineers, economists, utility staff, universities and businesses that can provide some of the technical guidance that is essential to plan for and implement initiatives. An example is the Steering Committee of the Medicine Hat Conservation Society, whose members are involved in energy matters through their jobs or roles.
- **Search out resources from other agencies of government.** During the past several years energy-related seminars, workshops, audio-visual materials and projects have proliferated. In some cases, local contractors, banks and real estate salespeople have built, financed and applied techniques to sell energy efficient projects, such as those presently being constructed under the Federal Super Energy Efficient Housing Program. In most cases, these resources are free or inexpensive. Examples are the "Municipal Workshops" and "Energy Audit Program - The Energy Bus" of Alberta Energy and Natural Resources. Most importantly, in combination or scheduled to occur on a continuing basis, they can help to maintain and promote community awareness and keep energy conservation before the local media and governing body.
- **Understand the motivation of the private sector.** Increasingly, builders and small businessmen are recognizing that investments in energy conservation are in their best interest and that cooperative relationships which draw upon the credibility and skills of local government can be to their advantage. Often it is necessary for these groups to have a context within which to articulate their viewpoint, where private interests and public policy can come together and be identified, and serve as the basis for action.

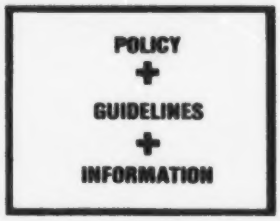
The Role of Land Use Planning

The goals developed by council or by the Advisory Committee will need to be sensitive to the opportunities which the land use planning system offers for dealing in a creative manner with energy conservation. Goals can be developed to reflect the three roles available to municipal government:

Formal Policy - requiring as a condition of subdivision or development approval that a proposed development or plan be consistent with energy conservation goals or objectives, or that it meets specific energy sensitive provisions of land use bylaws or statutory plans;

Guidelines or Incentives - suggesting as desirable practice that a proposed development or plan incorporate specific energy efficient characteristics; or offering incentives in return for the provision of such qualities in a project; and

Education and Technical Assistance - making available to homeowners, developers, business people, architects and builders, information or technical tools that can be applied in plans or development proposals, which will result in energy efficiencies.



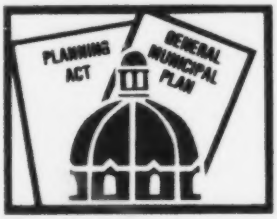
In the use of formal policy, a municipality could, as a start, examine its statutory plans and land use bylaw to see that there are no barriers to the adoption of good practices by those in the development and building industries. Removing barriers which prevent innovation has been found, in some communities, to stimulate those builders which are technically advanced to undertake projects they might not otherwise. The adoption of definitive standards, in statutory plans or land use bylaw shows a more active commitment to conserving energy than simply removing barriers. The development of performance standards, while presenting some administrative difficulties, has the considerable advantage of being more flexible than definitive standards, since they tend not to penalize designers or builders who are seeking the most effective solutions. The setting of "targets" to be reached in new housing is one method a municipality can employ to ensure energy-sensitive building occurs. Frequently, this approach works in support of programs of the federal and provincial governments which are targetted to reward builders who are innovative in the use of energy-sensitive building methodologies.

The use of incentives by a municipality can stimulate builders and developers to provide a more energy-sensitive product, the benefits of which will accrue to the residents and the community as a whole. For example the extra cost of building to a higher standard can be offset by a municipality offering, to qualified builders, a bonus in density or size of building.

The widespread acceptance of energy-sensitive projects depends upon government officials and the public being aware of the benefits such an approach will yield. Education, through the provision of information for the public and the building and development industries, can alter perceptions and the willingness to adopt new, cost-effective approaches. Recognition by a community of the contribution made by innovators in building or development, through an awards program, for example, is one means for educating the broader community. The provision of technical assistance to builders and their architects and engineers, when they apply for subdivision or development approval, can be a helpful and strategic contribution to energy-sensitive land use planning.

Using the General Municipal Plan

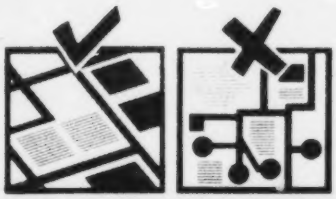
Using the General Municipal Plan (GMP) to mandate and to encourage conservation activities has a number of advantages: those developers and builders who want to offer to their clients an innovative and cost-effective energy-sensitive subdivision or building will be encouraged to do so; the leadership role the government has taken will encourage interest groups and organizations which have already concerned themselves with the energy issue; and the public-at-large and others will be stimulated to regard the conservation of energy as a legitimate activity, deserving of their involvement. Involving all of these factors on the Advisory Committee is a recommended way of ensuring the necessary input to council as the GMP policies are developed.



The Planning Act is worded in a manner so as to give a municipality a high degree of flexibility in determining what unique local concerns should be addressed in its GMP. Although the actual physical development of a community is the major focus of a GMP, it can be comprehensive in its investigation of community conditions, even though any resultant policies will be specifically aimed at land use.

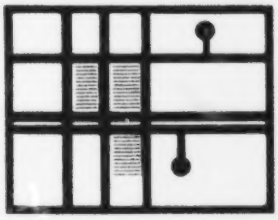
Most GMPs deal with at least the following five aspects of the community's future urban form: the location of land uses, the density of development, how land uses relate to each other, the location of the circulation system, and servicing.

In locating land uses, compactness should be sought, with as few discontinuous patterns of development as possible. In suburban areas, phasing of development can help to keep the compactness, as can the use of "town centre" developments. Infill should be encouraged rather than dependence on suburbanization to take all new growth. Sensitivity to the influence of wind and sun in the placement of uses can also contribute to the reduction of energy costs of both old and new residential developments.


COMPACT DEVELOPMENT SPRAWL DEVELOPMENT

The density of permitted development should be increased: market trends are already tending to encourage smaller units on smaller lots, which means decreased outlays for sewer, water and streets. Actions which support these market trends, by tightening density standards or building in flexibility, should be encouraged.

In the relationship among land uses, mixing uses in close proximity to each other tends to decrease travel patterns, and also opens up the possibility for the sharing of local energy resources (through district heating, for example).

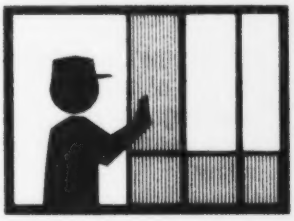


The location of the road network dramatically influences future travel patterns and therefore the future costs of energy spent on getting about the community. The nature of the road grid affects the costs of paving, maintaining, signing and so forth.

The location and sequence of water and sewage facilities determines not only the extent of the initial capital outlay for new development, but the future costs for maintenance and operations. More compact and contiguous urban forms will require smaller outlays for servicing, and are more energy-efficient over the long run.

Using the Area Redevelopment Plan

An area redevelopment plan (ARP) is a means by which a municipality can plan for the redevelopment of an older neighbourhood. Since plans of this nature generally do not deal with major realignments of streets, they tend to focus on re-use of existing lots within the existing pattern. The development of such a plan offers, therefore, an opportunity to engage the neighbourhood's residents in undertaking energy conservation in existing buildings. Weatherization and retrofitting activities, often with the help of such government programs as the Canadian Home Insulation Program (CHIP), can become integral elements in an appropriate development strategy. Opportunities for building realignment to take advantage of solar and wind should also be considered.

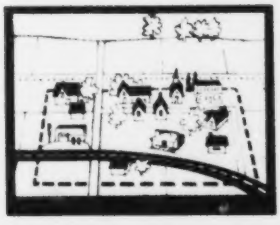


Local government can undertake a number of approaches, examples of which include:

- identify provisions that should be included in the redevelopment plan enabling retrofit for conservation and
- expand public awareness of options for conservation in existing housing through neighbourhood meetings or workshops.

Using the Area Structure Plan

In terms of detail and scope, an area structure plan (ASP) can be viewed as an intermediate step between a general municipal plan and a plan of subdivision. The plan, which may be prepared by a developer, municipality or planning authority, indicates the general proposed land uses for sectors of a municipality, showing development potential. The actual area structure plan contains: the sequence of proposed development; the proposed land uses; the proposed density of population, and the general location of major transportation routes and public utilities.



Like a GMP, the ASP offers the possibility of the integrated planning of a number of elements of the community which can result in energy savings: land use location, densities, mixed uses, transportation pattern and so on. Unlike the GMP, however, the ASP is generally at a small enough scale so that it can be used as a tool for negotiating with a single or, at most, a few developers.

Development of the ASP can provide a forum for bringing about trade-offs between various public and private sector priorities, encouraging developers to conserve energy through offering bonuses in density or floor area, or through permitting certain exemptions to the existing standards.

Using the Land Use Bylaw

At the most detailed level, a municipality influences the nature of development through its land use bylaw (LUB), which can be very specific in the way it details permitted uses, as in zoning; or rather general, permitting discretion, including the use of direct control districts. The land use bylaw is the basis for the review of subdivisions, and the issuing of development permits, so it permits local authorities considerable control over the location and form of new building activities.

Making the land use bylaw energy-sensitive requires an examination of all aspects of land use planning: location of uses, density, circulation, and servicing. Booklet #2 of this kit encompasses a detailed examination of these elements, in terms appropriate to a subdivision, and to a land use bylaw.

Using Disclosure and Guidelines

Two devices have been found useful by local governments in making this level of planning more energy-sensitive; viz: energy disclosures and energy efficient development guidelines.

An energy disclosure statement could be required as part of the data typically submitted with a proposed ASP. It could consist of information on:

- the anticipated fuel forms for space and water heating, cooling and other end uses for each of the major type of land uses that are proposed;
- estimated annual energy consumption by these end uses for the type of activity;
- maximum electric peak power demands; and
- sources for energy supply including any proposed local means such as solar.

The results of making this information available are educational for the developers, the municipal government, and the public-at-large and can contribute to an understanding of the energy costs that result from both private and public actions.

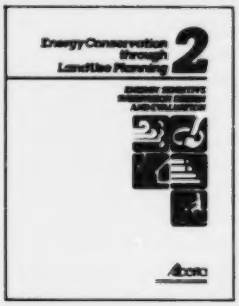
Energy efficient development guidelines set out ways to reduce or alter the potential patterns of energy use; as such, they are an important complement to energy disclosure statements. Such guidelines would be used as part of the negotiation process, when a developer is seeking preliminary review of a proposed development, before significant expenditure has been committed to a specific plan or detailed engineering, planning or architectural work. These guidelines would set out in some detail the energy-sensitive element reflected in a conservation-oriented GMP or ASP; such as

- the energy use implications of various densities and housing types;
- natural potentials - unique natural factors for wind protection, humidity control, natural drainage, native vegetation use etc.;
- transportation - approaches for locating activity centres and housing to enable cost-effective service by public transit, increase vehicle occupance, pedestrian and bicycle use;
- infrastructure - ways to reduce road lengths and paved surfaces, water and sewage line, the size of treatment facilities and requirements for on-going maintenance of public-rights of way etc.; and
- on-site energy generation - options and conditions for optimum use of solar insolation, utilization of waste heat, application of district heating or "total energy systems" etc.

Kit Components

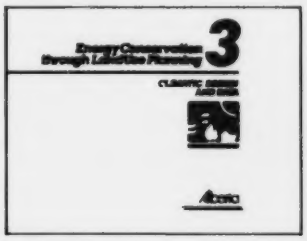
The Kit **ENERGY CONSERVATION THROUGH LAND USE PLANNING** consists of three components:

2. Energy Sensitive Subdivision Design and Evaluation



The handbook **Energy Sensitive Subdivision Design and Evaluation** forms the heart of the kit. The handbook asks a series of carefully sequenced questions to aid the user in identifying opportunity on a site for creating conditions favourable to achieving energy efficient development; or to identify problem areas that should be addressed.

3. Climatic Design and Data



Climatic Design and Data provides more detailed technical information on energy efficiency through site design, the effects of good site design upon building energy use and then presents data related to specific design measures. A technical appendix containing climate data for Alberta is also provided.

ACKNOWLEDGEMENTS

This kit is the result of a collaborative process involving many people and agencies. The input and advice from a number of energy professionals and land use planners are greatly appreciated. Any omissions or errors, however, are the sole responsibility of the Project Team.

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FIELD TESTING AND REVIEW

A number of events were used to generate and test ideas for the development of this kit. These events included the design of a pilot energy subdivision in Hanna (August to October 1983); two simulation workshops (September 29 and 30, 1983, and July 26, 1984); and the referral of the various draft documents to land use planners for comments throughout the process.

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Edmonton Metropolitan Regional Planning Commission: Sandra Fearon, Bea Fricson
Mackenzie Regional Planning Commission: Rob Roycroft, Therese Skoczylas
Oldman River Regional Planning Commission: Lorraine Grant
Palliser Regional Planning Commission: Bill Ashton
Red Deer Regional Planning Commission: Charleen Currie
South Peace Regional Planning Commission: Frank Liszczak
Yellowhead Regional Planning Commission: Neil Connelly, Chris Walker